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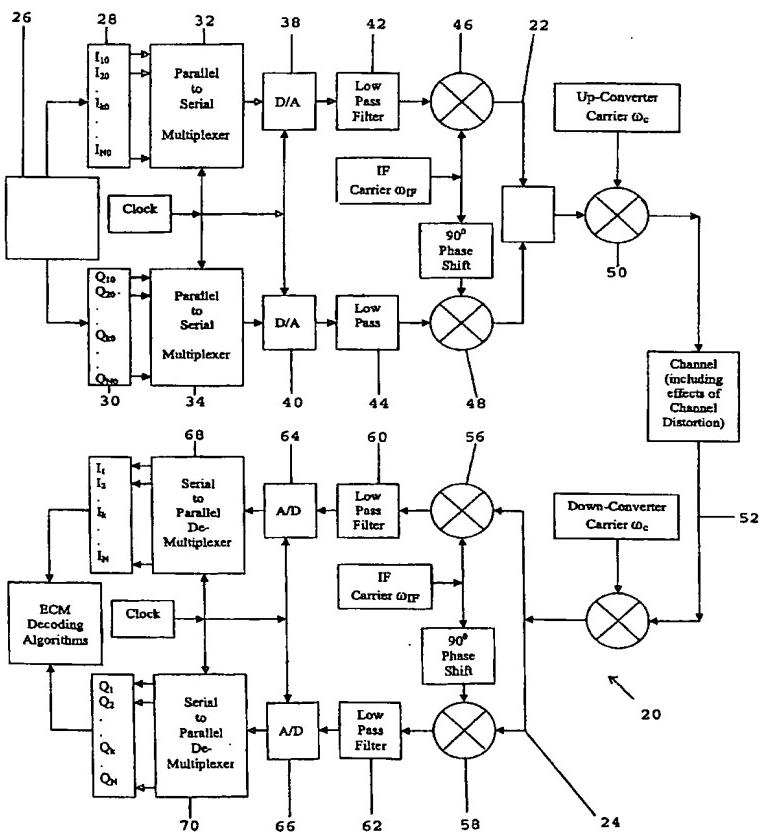
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(54) Title: MULTICARRIER SYSTEM WHEREIN CONTROL DATA IS SUMMED TO INFORMATION DATA



(57) Abstract: A system and method for encoding data for transmission over a telecommunications network. The system and method involve embedding a control data block (I_{k0}) within a plurality of real data blocks (I_{N0}). Preferably, real data in the real data blocks (I_{N0}) is convoluted with at least some of the control data in the control data block (I_{k0}). For example, each entry in each real data block (I_{N0}) may be phase convoluted with phase angle of the corresponding entry in the control block using an encoding module (26). Once this is done, the real data in the real data blocks and additionally the control data block in the control block is modulated with every sub carrier.



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A. CLASSIFICATION OF SUBJECT MATTER

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Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|---|--|
| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | WO 93/09622 A (MOTOROLA INC) 13 May 1993 (1993-05-13) | 1,2,7, 13-18, 20-22, 27, 32-36, 39-41, 45, 51-55, 58-60, 62-67 37,56 3-6, 8-12,19, 23-26, 28-31, 38, 42-44, 46-50, 57,61 |
| Y A | page 6, line 29 - page 9, line 3 page 13, line 5 - page 14, line 3 figures 1,4a,6a,6b ----- | |
| X | EP 0 752 779 A (NOKIA MOBILE PHONES LTD ; NOKIA TELECOMMUNICATIONS OY (FI)) 8 January 1997 (1997-01-08) | 1-5,7, 13-16, 21-25, 27, 32-34, 40-43, 45, 51-53, 59-67 37,56 6,8-12, 17-20, 26, 28-31, 35,36, 38,39, 44, 46-50, 54,55, 57,58 |
| Y A | column 2, line 45 - column 3, line 37 figure 2a ----- | |

INTERNATIONAL SEARCH REPORT

Information on patent family members

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|--|------------------|--|---|--|--|
| WO 9309622 | A 13-05-1993 | US AU AU BR CA CN GB HK JP JP KR MX WO | 5519730 A 663109 B2 2467792 A 9205509 A 2098011 A1 1072048 A ,B 2266645 A ,B 1000870 A1 6504176 T 3455537 B2 9612169 B1 9206164 A1 9309622 A1 | | 21-05-1996 28-09-1995 07-06-1993 05-04-1994 29-04-1993 12-05-1993 03-11-1993 01-05-1998 12-05-1994 14-10-2003 16-09-1996 01-04-1993 13-05-1993 |
| EP 0752779 | A 08-01-1997 | FI EP US | 953283 A 0752779 A2 5828650 A | | 04-01-1997 08-01-1997 27-10-1998 |